

- 1 1. A method comprising:
2 producing hydrocarbons from a subsea well in an
3 underbalanced condition using a rotating head mounted on a
4 surface blow out preventer.
- 1 2. The method of claim 1 including using the surface
2 blow out preventer to provide surface flow control.
- 1 3. The method of claim 2 including providing a
2 subsurface blow out preventer in addition to said surface
3 blow out preventer.
- 1 4. The method of claim 3 including providing
2 subsurface shear blow out preventers.
- 1 5. The method of claim 1 including coupling said
2 surface blow out preventers to the wellhead using casing
3 and providing a remotely operable subsurface latch to sever
4 the connection between said wellhead and said surface blow
5 out preventers.
- 1 6. The method of claim 5 including tensioning said
2 casing.
- 1 7. The method of claim 5 including providing a flow
2 of mud through a casing to a drill bit.

1 8. The method of claim 7 including lowering the
2 density of mud returning from said drill bit through said
3 casing.

1 9. The method of claim 8 including providing a
2 separate line to enable fluid to be pumped from the surface
3 to a subsurface location to lower the density of the
4 returning mud.

1 10. The method of claim 9 including providing a
2 tensioned line to provide said fluid from said surface.

1 11. The method of claim 10 including providing a
2 disconnectable latch to disconnect the line from the
3 wellhead.

1 12. The method of claim 11 including providing a
2 subsurface blow out preventer and providing said line to
3 said subsurface blow out preventer.

1 13. The method of claim 12 including providing a pair
2 of shear ram subsurface blow out preventers and pumping
3 said fluid between said shear blow out preventers.

1 14. The method of claim 13 including providing a
2 remotely operable valve to control the flow of said fluid
3 and positioning said valve at a subsea location.

1 15. The method of claim 1 including providing a
2 rotating head that transfers rotational energy to said
3 drill string through a packer.

1 16. The method of claim 15 including providing said
2 rotational energy through a resilient packer.

1 17. A drilling rig comprising:
2 a rotating head;
3 a surface blow out preventer mounted under said
4 rotating head on said rig; and
5 an apparatus to pump fluid to a subsea location
6 to lower the density of drilling mud returning to said rig.

1 18. The rig of claim 17 including a casing coupled
2 from said surface blow out preventer to a subsea subsurface
3 blow out preventer.

1 19. The rig of claim 18 wherein said subsea blow out
2 preventer includes a pair of shear blow out preventers.

1 20. The rig of claim 19 including a remotely operable
2 latch to sever said casing from said subsea blow out
3 preventer.

1 21. The rig of claim 20 wherein said casing is
2 tensioned.

1 22. The rig of claim 17 including a separate line to
2 supply lower density fluid to a subsea location to lower
3 the density of drilling mud to be returned to said rig.

1 23. The rig of claim 22 wherein said line is
2 tensioned.

1 24. The rig of claim 23 wherein a disconnectable
2 latch is provided to disconnect the line at a subsea
3 location.

1 25. The rig of claim 17 including a subsurface blow
2 out preventer and a coupling to receive said line.

1 26. The rig of claim 25 wherein said subsurface blow
2 out preventer includes a pair of shear ram subsurface blow
3 out preventers and said coupling is arranged between said
4 pair of shear ram subsurface blow out preventers.

1 27. The rig of claim 26 including a valve in said
2 line to control the flow of fluid to lower the density of
3 said drilling mud.

1 28. The rig of claim 17 wherein said rotating head
2 includes a resilient packer and a drill string and tubing,
3 said resilient packer to seal the region between said drill
4 string and said tubing and to transfer rotational energy
5 from said tubing to said drill string.

1 29. The subsea shutoff assembly comprising:
2 a pair of shear blow out preventers; and
3 a device coupling said blow out preventers, said
4 device having an inlet to receive a density lowering fluid
5 to lower the density of drilling mud moving upwardly
6 through said device.

1 30. The assembly of claim 29 including a line for
2 supplying density lowering fluid, said line including a
3 remotely actuatable valve.

1 31. The assembly of claim 30 wherein said valve
2 automatically closes upon loss of control.

1 32. A method comprising:
2 operating a subsea wellhead in an underbalanced
3 condition;
4 providing mud at a first density to said
5 wellhead; and
6 injecting, from the sea surface, a first density
7 lowering fluid, into mud returning from said wellhead,
8 through tensioned, latched tubing.

1 33. The method of claim 32 including producing
2 hydrocarbons from a subsea well in an underbalanced
3 condition using a rotating head mounted on a surface blow
4 out preventer.

1 34. The method of claim 33 including using the
2 surface blow out preventer to provide surface flow control.

1 35. The method of claim 34 including providing a
2 subsurface blow out preventer in addition to said surface
3 blow out preventer.

1 36. The method of claim 35 including providing
2 subsurface shear blow out preventers.

1 37. The method of claim 32 including providing a
2 separate line for said first density lowering fluid to be
3 pumped from the surface to a subsurface location mud.

1 38. The method of claim 37 including providing a
2 subsurface blow out preventer and providing said line to
3 said subsurface blow out preventer.

1 39. The method of claim 38 including providing a pair
2 of shear ram subsurface blow out preventers and injecting
3 said first density lowering fluid between said shear blow
4 out preventers.

1 40. The method of claim 39 including providing a
2 remotely operable valve to control the flow of said fluid
3 and positioning said valve at a subsea location.

1 41. The method of claim 33 including providing a
2 rotating head that transfers rotational energy to said
3 drill string through a packer.

1 42. The method of claim 41 including providing said
2 rotational energy through a resilient packer.

1 43. A system for supplying density lowering fluid to
2 a subsea location comprising:

3 a surface hanger to tension and hang tubing
4 connectable to a source of density lowering fluid; and

5 a subsea latch to couple a first portion of said
6 tubing to a second portion of said tubing, said latch being
7 remotely operable to disconnect said first portion of said
8 tubing from said second portion of said tubing.

1 44. The system of claim 43 including a subsea valve
2 to control the rate of flow of fluid through said tubing.

1 45. The system of claim 44 wherein said valve is
2 coupled to a connector to couple said tubing to a subsea
3 location.

1 46. The system of claim 43 including a subsea shutoff
2 assembly coupled to said tubing.

1 47. The system of claim 46 wherein said subsea
2 shutoff assembly includes a pair of shear ram blow out
3 preventers coupled to one another.

1 48. The system of claim 47 including a coupling to
2 connect said shear ram blow out preventers to one another,
3 said coupling adapted to receive said tubing, said coupling
4 to pass drilling fluid downwardly through a central passage
5 and upwardly through a radially displaced passage.

1 49. The system of claim 43 wherein said latch
2 disconnects upon detection of a failure.

1 50. The system of claim 43 wherein said hanger
2 includes a hydraulic ram to grip said tubing.